Space Weather Forecast

Issued on Sunday, 12 February 2023 at 01:25 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: Chance of Strong flares with Moderate flares (R1/R2 Radio Blackouts) expected.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: High with a Strong flare observed from the modestly sized but complex sunspot region in the southeast disc, peaking at 11/1548 UTC. There are thirteen sunspot groups on the disc, with seven Moderate class flares observed. These mainly from this region, but also from some of the smaller spots on the disc. The other large region of interest is in the northwest and has been active on previous days, but shown signs of simplification through the last 24 hours. There is also a further large region in the northwest, but closer to centre, that has been relatively inactive. This remains a simple bipolar group but with some emergence of intermediate spots. The other regions have remained smaller and stable.

A filament eruption in the northeast, which is where a line of the Sun's plasma gets ejected in the northwest disc around 11/1050 UTC, produced a moderately fast CME (coronal mass ejection). Whilst this is likely to largely miss Earth, analysis is currently ongoing. All other CMEs are off the Earth-Sun line.

Solar Wind / Geomagnetic Activity: Solar winds continued to be slightly elevated. Observed speeds ranged between 450-530 km/s. The magnetic field strength was mainly weak, with the north-south component varying weakly. Geomagnetic activity was Quiet to Unsettled (Kp 1-3).

Energetic Particles / Solar Radiation: The count rate of energetic particles is at Background levels with no solar radiation storms observed.

Four-Day Space Weather Forecast Summary

Solar Activity: High to Moderate activity with further Moderate flares expected and a chance of Strong flares. The main risk is from the small but compact sunspot in the southeast that produced the strong flare on the 11th.

Solar Wind / Geomagnetic Activity: Any Earth-directed component from the CME from the filament eruption on the 11th requires further assessment, giving low confidence for the geomagnetic forecast. Otherwise a CME which left the Sun on the 10th, while forecast to miss the Earth, give a low chance of glancing interactions on day 3 (14th). Aside from these CMEs, current slightly elevated solar winds are expected to only erratically ease, with no significant enhancements expected. Geomagnetic activity is expected to be mostly Quiet to Unsettled. Any CME glance, however, has the potential to bring a more persistent Unsettled to Active spell, and a very slight chance of G1 Minor Storms day 3 (14th).

Energetic Particles / Solar Radiation: The count rate of energetic particles is expected to remain at background, but there is a very slight chance of this increasing towards the S1/Minor radiation storm level in response to any significant flares that occur.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	1	1	10	1
Strong	G3	No	1	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	80	70	60	50
Very Active	R3 to R5 X	Yes	30	20	10	10

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	15	15	15	15
Very Active	≥ S3 *	No	1	1	1	1
* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)						

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